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Before the
Federal Communications Commission
Washington DC 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matters of)

Request for Declaratory Ruling on)
Partial-Band Licensing of Earth)
Stations in the Fixed Satellite Service)
that Share Terrestrial Spectrum)

RM-9649

Petition for Rule Making to Set)
Loading Standards For Earth Stations)
in the Fixed Satellite Service that)
Share Terrestrial Spectrum)

REPLY COMMENTS OF THE
FIXED WIRELESS COMMUNICATIONS COALITION

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July 27, 1999

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SUMMARY

The Commission's licensing rules and coordination procedures favor the satellite services over the fixed terrestrial services, even when both are “coequal” in shared spectrum, from the standpoint of spectrum management. Earth stations are routinely licensed for the entire band, even if they plan to use only a small part of it. And an earth station's full-band license enables it to block coordination of a subsequent fixed service applicant, even in parts of the band the earth station has no plans to use.

The FWCC's Petition of May 5, 1999, in the spirit of the Commission's preceding *en banc* hearing on spectrum management, proposed three measures to redress the imbalance between satellite and terrestrial services: (1) a declaratory ruling that limits the licensing of an earth station to twice the spectrum it actually needs; (2) a rule change to require an earth station to certify, 30 months after licensing, that it is loaded to at least half its licensed bandwidth; and (3) coordination procedures requiring an earth station that chose its site despite fixed service interference to accept equal or less interference from subsequent fixed service applicants. Notwithstanding procedural challenges, the Petition sets out proper grounds for a declaratory ruling and makes an ample public interest showing.

The remedies sought by the FWCC are needed in part because of several recent Commission actions and proposals that superimpose or expand satellite operations in spectrum used by the fixed service. Yet, despite the growing congestion in shared spectrum, the satellite community continues to expect full-band licensing as a matter of right. Earth stations routinely coordinate hundreds of megahertz at a time, needed or not.

Unsurprisingly, the satellite industry's comments in this proceeding seek to maintain the *status quo*. Most parties do not even deny that they benefit from inequitable licensing and coordination procedures. Rather, they try to justify their favored position on the basis of a need for “flexibility” to respond to contingencies such as equipment failure or unexpected demands for service.

The FWCC does not seek changes that would impair earth station operators' legitimate needs for flexible spectrum use. Indeed, there is no quarrel with any use of spectrum by any earth station. The objection is only to earth station privileges over *unused* frequencies — particularly the automatic, wholesale authorization of spectrum whether needed or not. However, although the FWCC seeks to limit earth stations to twice the bandwidth they actually need, we still support a broad reading of “actual need.” For example, we think earth station licenses should cover adequate spectrum for international providers that are subject to Intelsat's choice of transponders, facilities that routinely access multiple satellites, such as broadcasters and teleports, and even providers serving third-party customers with unpredictable demands. On the other hand, an earth station using one transponder on one satellite should not be able to block an FS applicant over the entire band. And the fixed service should not have to forgo badly needed spectrum merely to provide reserve frequencies to the satellite industry for unspecified contingent use.

Contrary to concerns in some of the comments, the FWCC does not seek exact parity with the satellite services. For example, the FWCC does not request either bits-per-Hertz efficiency standards or azimuth-limited coordination for earth stations, even though fixed service

facilities are subject to both requirements. Earth station loading standards, however, are needed to enforce the limitations on bandwidth to twice actual need.

Some comments oppose the FWCC's requested changes to coordination procedures. Today, an earth station can site itself near an FS station by agreeing to accept its interference — for example, because the earth station operator knows it will use different frequencies, or be safe behind a berm. But when another FS station seeks coordination on the same frequencies, or behind the same berm, the earth station is free to refuse. The FWCC's proposal would simply require an earth station that accepts interference on choosing its site to accept the same interference (but not more) from later-arriving FS applicants.

Some satellite commenters protest this procedure. They say one interfering FS station might be acceptable, but addition of a second would push the interference beyond manageable limits. Or, FS operation on adjacent bands might be intolerable, or attenuation might not be uniform across the berm. But these objections are technically groundless. In the worst case, a second FS station with interference equal to the first would add only an insignificant 3 dB to the total, and the other effects cited would contribute far less. The FWCC's proposals will not add appreciable interference to earth stations.

In conclusion, we note that competition has been an exceedingly effective tool for fostering new services at reasonable prices. But all the benefits of effective competition for wireless services, including the fixed service, ultimately depend on adequate spectrum. Allowing satellite earth stations to license and reserve spectrum far in excess of their needs is nothing more than waste of an irreplaceable resource, and the waste of an opportunity to benefit the American public.

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**REPLY COMMENTS OF THE
FIXED WIRELESS COMMUNICATIONS COALITION**

The Fixed Wireless Communication Coalition (FWCC)¹ hereby replies to the comments and oppositions filed in response to the Request for Declaratory Ruling and Petition for Rule Making of the Fixed Wireless Communications Coalition (Petition) filed on May 5, 1999, in the above-captioned docket.²

¹ The Fixed Wireless Communications Coalition is a coalition of equipment manufacturers and users interested in terrestrial fixed microwave communications. Its membership includes manufacturers of microwave equipment, licensees of terrestrial fixed microwave systems and their associations, and communications service providers and their associations. Its membership also includes railroads, public utilities, petroleum and pipeline entities, public safety agencies, the broadcast industry, and their respective associations, telecommunications carriers, landline and wireless, local, and interexchange carriers, and others. A list of members is attached as Appendix A.

² The Petition appeared on public notice in Report No. 2334 (released June 11, 1999). The following timely comments and oppositions were filed: Opposition of Comsat Corporation (Comsat); Comments of Corporate Satellite Communications, Inc. (CSC); Opposition of GE American Communications, Inc. (GE Americom); Opposition of Home Box Office (HBO); Opposition to Request and Petition of Iridium LLC (Iridium); Letter from W. Mark McKibben, McKibben Communications Corporation, to Magalie R. Salas, FCC (McKibben); Opposition from the Satellite Communications Division of the Telecommunications Industry Association (SCD); Opposition of the Satellite Industry

A. Introduction

1. Summary of the Petition

The Commission's Rules call for certain bands to be shared “coequally” by the Fixed Satellite Service (FSS) and terrestrial microwave fixed service (FS). Yet the bands are not shared equally in practice. For example, fixed terrestrial services sharing satellite bands are generally limited to frequencies actually installed and operated, and are subject to stringent requirements for both spectrum efficiency and loading. Protection channels are limited to one for each three working channels, and even those must be relinquished if needed by others before they are needed by the licensee. In contrast, the Commission routinely licenses an FSS earth station for the entire allocated band, without regard to any actual need for bandwidth, and with no requirements as to either efficiency or loading. Commission-accepted frequency coordination procedures allow earth stations to “warehouse” large amounts of licensed but unused spectrum. An earth station may deny coordination to a FS station on the basis of interference criteria that the earth station itself accepted when it opted to build on that site.

The FWCC's Petition requested a declaratory ruling that an FSS earth station using spectrum shared with point-to-point terrestrial services may be licensed and coordinated only for the amount of spectrum for which it has demonstrated actual need, plus a 100% margin that the earth station operator can keep in reserve. The FWCC also asked the Commission to amend its Rules to require FSS earth stations that share spectrum with terrestrial fixed services to meet minimum loading standards. Finally, the FWCC asked that FSS earth stations be required to

Association (SIA); Comments of SkyBridge L.L.C. (SkyBridge); Opposition of Sprint Corporation (Sprint); and Opposition of Williams Communications, Inc. (Williams).

accept interference from new terrestrial facilities on the same basis as they accepted any interference in their initial coordination.

2. The Petition seeks effective and equitable spectrum management.

The Petition was filed shortly after the Commission's March 8, 1999, *en banc* hearing on spectrum management, and was intended in the spirit of that hearing. The radio frequency spectrum is a limited resource for which demand far outpaces supply. It must accommodate multiple users of multiple radio technologies. But recent Commission decisions and proposals have threatened the balance by re-allocating bands away from the FS for satellite use, and by increasing the sharing burdens on FS to accommodate new satellite operations in other bands.³

³ First came a reallocation of 2 GHz band frequencies from the Fixed Service to mobile satellite services. Redevelopment of the Spectrum to Encourage Innovation in New Telecommunications Technology, ET Docket No. 92-2, First Report and Order, 7 FCC Rcd 6886 (1992), Second Report and Order, 8 FCC Rcd 6495 (1993), Third Report and Order, 8 FCC Rcd 6589 (1993). The same proceeding also allocated 2 GHz frequencies to PCS. Then, despite having identified the 6 GHz band as a primary relocation site for 2 GHz users, Second Report and Order, *supra*, 8 FCC Rcd at 6506, ¶ 28, the Commission proposed designating the upper 6 GHz band (6700-7075 MHz) for mobile satellite feeder links. Amendment of Parts 2, 25 and 97 of the Commission's Rules with Regard to Mobile Satellite Service Above 1 GHz, 13 FCC Rcd 17107 (1998); Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band, IB Docket No. 99-81, Notice of Proposed Rulemaking, FCC 99-50 (released March 25, 1999). The Commission also proposed a similarly severe reduction of spectrum available to the FS in the 18 GHz band. Redesignation of the 17.7-19.7 GHz Frequency Band, 13 FCC Rcd 19923 (1998). The ongoing Ku-band proceeding threatens to move NGSO gateway stations into the already-congested 11 GHz band, and to expand GSO FSS downlink operations from half that band to the full band. NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems, ET Docket No. 98-206, Notice of Proposed Rulemaking, FCC 98-310 (released Nov. 24, 1998)(for proposal to expand GSO FSS operations, *see* Appendix A, C.F.R. § 25.202(a)(1) (proposed)). The "shared" 3.7-4.2 GHz band has become effectively unavailable to the FS due to the extremely difficult problems of coordinating new FS stations with existing licensed earth stations. In the 36-51 GHz band, satellite interests have filed petitions to overturn an equitable distribution of spectrum between satellite systems and wireless operations, including the FS. Petition for Reconsideration of Hughes Communications, Inc. (filed Feb. 16, 1999) (seeking reconsideration of Allocation and Designation of Spectrum, IB Docket No. 97-95,

The Petition explains in detail why sharing is difficult under the present rules, and will become worse as satellite allocations encroach further into fixed service spectrum.

Comsat notes that the present coordination rules worked well in the 1960s, when the few earth stations in place were remotely sited gateways with large antennas. We agree with Comsat that the Petition would probably not be needed in that environment.⁴ But we strongly disagree that the coordination rules “have withstood the test of time” since then.⁵

To be sure, the proliferation of earth stations since the 1960s reflects the growth of a valuable industry in satellite telecommunications. But all those earth stations have made the coordination of likewise valuable FS services increasingly difficult. The 4 GHz band is the worst case; coordinating new or expanded FS operations there is virtually impossible because satellite earth stations have all but filled the band. But even though other shared bands are headed in the same direction, the satellite community has continued to expect full-band licensing as a matter of right. Its operational practices fail to recognize and accommodate the growing congestion in shared spectrum. Earth stations routinely coordinate hundreds of megahertz at a time, while fixed service spectrum must be carefully engineered and coordinated on a precise, as-needed basis. Exacerbated by the ongoing reallocation of FS spectrum to satellite communications, the coordination rules have unfairly disadvantaged the fixed services with the loss of available spectrum due to satellite expansion.

Report and Order, FCC 98-336 (released Dec. 23, 1998)); Petition for Reconsideration of GE American Communications, Inc. (filed Feb. 16, 1999) (same); Petition for Reconsideration/ Clarification of TRW, Inc. (filed Feb. 16, 1999) (same).

⁴ Comsat at 5-6.

⁵ Comsat at 5.

By and large, the responding satellite operators do not deny that they benefit from inequitable coordination procedures.⁶ To the contrary, they try to justify their favored position on the basis of contingencies such as equipment failure or the need to accommodate unexpected demand for service.⁷ Fixed service providers share these problems, of course, but the Commission's Rules bar them from protecting themselves by reserving large blocks of spectrum in advance.

Despite the fears expressed in some comments, the FWCC does not seek any measures that would impair earth station operators' legitimate needs for flexible spectrum use. **We have no quarrel with any use of spectrum by any earth station. We object only to earth station privileges over *unused* frequencies.** We particularly protest the automatic, wholesale authorization of unneeded spectrum to accommodate every possible contingency in the operation of a satellite system, while other users, providing equally important services, are dislocated or limited in their own access to the spectrum they need.⁸ The FWCC's goal in this proceeding is effective and equitable spectrum management.

⁶ Comsat is an exception. *See* Comsat at 14-17.

⁷ These positions are detailed in Part C, below.

⁸ GE Americom (at 8) notes that the fixed service has access to substantial bandwidth not shared with satellite operators. The bands to which GE Americom refers are all short-wavelength bands with relatively poor propagation characteristics due to rain attenuation, suitable only for short-haul use. Except for a small amount of spectrum at 10 GHz, the bands most practical for long haul carriage (such as 4, 6, and 11 GHz) are all shared with FSS.

3. The Petition seeks equitable rules, not identical rules.

Contrary to the concerns expressed in some oppositions, the Petition does not ask to impose the same rules on FSS and the fixed service.⁹ The FWCC appreciates the important technical and operational differences between the FSS and the FS, and also the differences among the many specific kinds of services that make up each. We do request *equitable* rules, but those will not be the same for the two kinds of services.

For example, although the FS operators in shared bands (4, 6, and 11 GHz) are subject to exacting spectrum efficiency standards,¹⁰ SIA's fears that we seek to impose such standards on satellite operations have no support in the Petition.¹¹ We understand that bits-per-Hertz standards for FSS would be unrealistic in view of long lead times and numerous other constraints on satellite system design,¹² and we do not believe they are generally necessary for equitable sharing. (The Commission should nevertheless encourage better spectrum efficiency for future systems, in cases where efficient modulation techniques can be integrated into an overall

⁹ GE Americom at 3,4; Iridium at 2; SIA at 7-8; Comsat at 10-11.

¹⁰ 47 C.F.R. § 101.141(a)(3). The Fixed Service introduced 16-QAM (at 4 bits/second/Hertz) in the early 1980s. It advanced to 64-QAM (6 bits/second/Hertz) a few years later, and today typically uses 128-QAM (7 bits/second/Hertz). Modulation technologies that permit up to 9 bits/second/Hertz are becoming available. Additionally, through the Telecommunications Industry Association (TIA) and the National Spectrum Managers Association (NSMA), the Fixed Service has developed comprehensive and effective methodologies for coordination of Fixed Service routes with maximum frequency re-use.

¹¹ SIA at 8. SCD (at 5) and GE Americom (at 5) argue that FSS operators in fact use space segment efficiently. Without embarking on a technical comparison, we reiterate that the FWCC claims not inefficient use of occupied spectrum, but licensing of excessive amounts of *unoccupied* spectrum.

¹² See GE Americom at 5; SkyBridge at 8; SCD at 3, 5 (large investment and long lead times for spacecraft and ground segment facilities).

design.¹³) The continued licensing of excess spectrum, as at present, functions as a disincentive to spectrum efficiency. But rules proposed in the Petition will improve efficient use of the shared bands overall, by allowing FS facilities access to frequencies that earth stations now keep idle.

As another example of our support for different rules in the two services, we do not request azimuth limitations on earth station coordinations, even though FS operators must coordinate for specific azimuths.¹⁴ SkyBridge correctly notes that the actual separation distance between an earth station and a coordinated FS facility will depend on where the FS station falls in the earth station antenna pattern.¹⁵ Assuming the earth station has coordinated only for the azimuths corresponding to the satellites it actually uses, the coordination will ordinarily reflect an appropriate minimum separation distance at each azimuth.¹⁶

¹³ In other proceedings, for example, the FWCC proposed efficiency standards specifically for new NGSO feeder link operations in certain shared bands. *See* SkyBridge at 7 n.20; Comments of the FWCC in ET Docket No. 98-206 at 10-11 (filed March 2, 1999); Comments of the FWCC in IB Docket No. 99-81 at 5 (filed June 24, 1999); Reply Comments of the FWCC in RM-9650 (filed July 27, 1999). These standards would apply to systems of satellites and earth stations that are still unbuilt, will communicate only with each other components of the same system, and will not interoperate with each other or with existing equipment. Efficiency standards in this special environment do not present the same difficulties that would arise in an effort to phase new standards into complex, existing networks of earth stations and satellites.

¹⁴ *See* SkyBridge at 4.

¹⁵ SkyBridge at 4.

¹⁶ Although the FWCC does not object to 360-degree coordination as a general matter, we have raised the issue in the specific context of NGSO feeder links in shared spectrum. *See* Comments of the FWCC in ET Docket No. 98-206 at 10-11 (filed March 2, 1999); Comments of the FWCC in IB Docket No. 99-81 at 5 (filed June 24, 1999); Reply Comments of the FWCC in RM-9650 (filed July 27, 1999).

B. The Petition Satisfies Applicable Procedural Requirements.

Opponents raise unfounded procedural objections to the Petition.

First, some parties cite the language of Section 1.2 of the Rules to argue that declaratory relief is appropriate only to terminate a controversy or remove uncertainty.¹⁷ The FWCC agrees, but is confident this matter presents the requisite controversy and uncertainty. The single issue on which the FWCC seeks declaratory relief — that an earth station using shared spectrum be licensed and coordinated only for spectrum actually needed, plus a 100% margin — is fully consistent with the Rules, and so does not require a rulemaking. The FWCC's request also comports with the general principles of spectrum management applied in other services, favoring maximum utilization consistent with adequate interference protection. The practice of full-band earth station licensing is directly contrary to these principles. In no other un auctioned service may a licensee withhold hundreds of megahertz of vacant spectrum from others who would put it good use. This anomaly in construction of the Rules raises controversy and uncertainty sufficient to support an action for declaratory ruling.¹⁸

Nevertheless, the principles advanced by the FWCC are more important than the procedural vehicle. If the Commission concludes that a request for declaratory ruling does not

¹⁷ 47 C.F.R. § 1.2. *See* GE Americom at 4; Sprint at 4; CSC at 1-2.

¹⁸ The sole case cited for the contrary proposition is inapposite. BellSouth's Petition for Declaratory Ruling, 6 FCC Rcd 3336 at ¶ 26 (Common Carrier Bur. 1991), *cited at* CSC at 2, found inadequate uncertainty and controversy to support a declaratory ruling because the Commission had already ruled on precisely the same issue against the same petitioner. That is not the case here.

lie, the FWCC does not object to having its request folded into a rulemaking. The Commission has kept that option open by including the entire Petition in its Public Notice.¹⁹

Second, some satellite interests claim the FWCC has failed to show how its request would serve the public interest.²⁰ But the FWCC made that showing amply, in three steps. First, the FWCC stated that the fixed service — specifically, its own membership — is vital to the operation of railroads, public utilities, petroleum and pipeline entities, public safety agencies, the broadcast industry, and telecommunications carriers, including landline, wireless, local, and interexchange carriers.²¹ This point is not open to serious dispute. Second the Petition explained how inequitable licensing rules and coordination procedures deprive the FS of spectrum needed to meet the present and future needs of its users.²² We doubt that opponents would seriously question this point, either.²³ And, third, the Petition proposed specific remedies to help relieve

¹⁹ Report No. 2334 (released June 11, 1999). Sprint suggests that the Commission begin this proceeding with a Notice of Inquiry to obtain information about the current users and services in the shared bands, and to request proposals for rules. Sprint at 4-5. This idea seems to be intended chiefly as a means of delay. The Commission is well aware of the users and services in these bands. The FWCC has put specific proposals for rules on the table, and the satellite interests have made the equally specific counterproposal of leaving the rules and procedures unchanged. The limited-band licensing issue is ripe for declaratory ruling, and the other issues raised in the Petition are ready for an NPRM.

²⁰ Comsat at 4; Iridium, at 2. *See also* SIA at 2 (no reasoned basis shown for change in the status quo); CSC at 2-3 (no evidence given that existing practice has a significant effect on terrestrial systems).

²¹ Petition at 1 n.1.

²² Petition at 6-8.

²³ Skeptics might consider the 4 GHz “shared” band, in which ubiquitously deployed FSS receive earth stations coordinated for the full band have made it all but impossible to coordinate new fixed service links.

the spectrum shortage without significantly burdening satellite operations.²⁴ Although the satellite interests challenge the magnitude of the burdens, as we discuss below, they do not dispute the fixed service's spectrum needs.²⁵

C. Grant of the FWCC Petition Will Not Impair Earth Station Operators' Legitimate Needs for Flexibility.

The satellite interests responding to the Petition maintain that earth station operators need the flexibility afforded by full-band licensing.²⁶

It bears repeating that the FWCC does not seek any reduction in actual earth station spectrum usage. Our sole concern is earth station control over *unused* spectrum. Moreover, the FWCC's proposal would let an earth station reserve fully twice the spectrum it actually needs. And, depending on circumstances, our view does not limit “actual need” to a single satellite and transponder.²⁷

The claims of need for flexibility come in four categories:

1. To meet changing demand. Satellite interests note that earth stations sometimes must use satellites and transponder frequencies whose choice is beyond the earth station

²⁴ Petition at 8-13.

²⁵ *But cf.* note 8, above.

²⁶ Specific citations appear below.

²⁷ Some satellite interests fear the FWCC proposals would sharply increase the number of earth station license applications. GE Americom at 3, 10; HBO at 2, 7; Williams at 4; SIA at 7; Comsat at 20-21. We believe this concern is misplaced. The guidelines laid out in text below should enable the vast majority of earth stations to coordinate and license at the outset all the spectrum they are likely to need for a lifetime of normal operation.

operator's control.²⁸ Demand for capacity fluctuates, and the operator cannot always predict which transponders will be available when new capacity is needed.²⁹ Some earth stations require access to different transponders at different times for brief or occasional transmissions such as news, weather-related emergencies, political events, and sports contests.³⁰ Earth stations may need the flexibility to access new satellites, or to avoid interference from new adjacent satellites.³¹ Sprint notes that Intelsat assigns capacity unilaterally, and that international carriers must either accept Intelsat's assignment or go back to the end of the line.³² Comsat sometimes must rearrange customers' use of Intelsat transponders to accommodate demand.³³

2. For teleports and other large facilities. Some commenters point out that large earth station facilities may employ multiple antennas and communicate with a constantly changing mix of satellites, both U.S. and non-U.S. licensed, over a wide range of orbital arc and frequencies, so that restriction to specific frequencies would impede routine operations.³⁴ Large teleports in particular must change orientations and frequencies often as they transmit and receive on behalf of multiple customers from a large array of satellites and transponders.³⁵

²⁸ HBO at 4; Williams at 3.

²⁹ GE Americom at 6-7, 10-11.

³⁰ SIA at 6.

³¹ SCD at 3; Comsat at 13-14.

³² Sprint at 2.

³³ Comsat at 20. Without full band coordination, Comsat adds, satellite operators would have to multiply earth station sites in order to add bandwidth. Comsat at 11-12.

³⁴ HBO at 2.

³⁵ HBO at 5 n.4; Williams at 2.

3. ***For NGSO feeder links.*** One filing notes that NGSO earth stations must have access to multiple frequencies so as to switch to different satellites as they come into view.³⁶

4. ***To recover from equipment failures.*** Several parties argue that earth stations need the flexibility to change frequencies in response to transponder failure, satellite aging, decommissioning, etc., and that operators cannot always know what satellites and transponders will be available until an emergency occurs.³⁷

We repeat: the Petition does not seek any measures that would infringe on earth station operators' legitimate needs for flexible use of the spectrum. Indeed, the Petition anticipated many of the issues summarized above. In asking the Commission to limit earth stations to “twice the amount of bandwidth for which the applicant has demonstrated actual need,” the Petition went on to discuss “actual need”:

An applicant might demonstrate actual need, for example, by certifying that it has the appropriate contracts for transponder usage, or by certifying minutes of usage per day, or by justifying the bandwidth applied for in terms of the service proposed. FSS users such as broadcast networks, which may need routine access to several transponders on multiple satellites, might be able to take those multiple facilities into account in assessing actual need.³⁸

These examples account for most of the cases raised by the satellite interests. By way of clarification, the FWCC believes an earth station operator can legitimately show actual need for bandwidth, beyond that immediately used, in appropriate cases where

³⁶ SIA at 5 n.10.

³⁷ GE Americom at 6; HBO at 5; SIA at 5; SkyBridge at 9 n.22.

³⁸ FWCC Petition at 8.

- the satellite or frequency are wholly at the discretion of a space segment provider independent of the earth station operator;
- the earth station operator's business routinely requires ready access to multiple satellites (as in the broadcast network example above);
- an earth station complex has multiple antennas pointing at multiple and changing satellites;
- an earth station operator provides service to independent third parties with unpredictable space segment needs;
- an earth station coordinates to use a satellite known to be nearing the end of its useful life; or
- an NGSO feeder link earth station requires access to the multiple satellites in a system.

(We ask the Commission to note that some of these criteria may open the potential for abuse by earth station applicants, and will have to be administered in good faith.)

On the other hand, where an earth station serves only a small number of users, and in normal operation accesses only a particular transponder on a particular satellite, there is ordinarily no need to license and coordinate more than twice the bandwidth actually used. Similarly, earth stations should not be permitted to reserve and coordinate spectrum on the ground that they may have to carry occasional, short-term special events. These can be accommodated with a temporary license and expedited coordination, when necessary. We also feel strongly that earth stations should not be permitted to coordinate additional spectrum (beyond twice that actually needed) merely as a precaution against transponder or satellite failure. This practice is fundamentally inequitable: it amounts to short-changing the fixed service in order to protect the FSS industry against the risk of failure of its own equipment. The 100% extra margin of bandwidth proposed by the FWCC should facilitate an earth station's contracting

for back-up transponders on a contingency basis. If that margin is insufficient in a particular case and a failure does occur, emergency coordination is available.

Post-licensing loading standards. Several satellite interests object to loading standards for earth stations, on the same grounds as they oppose limited-band licensing. In addition, GE Americom asks if short-term use, such as news, emergencies, natural disasters, etc., would count toward satisfying loading requirements.³⁹ Other parties note that loading standards cannot obviously be applied to spread spectrum systems, which occupy the entire band,⁴⁰ or to feeder link operations, whose traffic depends on the use of service links in another band.⁴¹ SkyBridge objects to disclosing loading data, on the ground it is commercially sensitive information.⁴²

Loading standards do not raise significant policy issues apart from limited-band licensing. Rather, they are merely an enforcement mechanism to prevent earth stations from routinely using only a small part of the spectrum they coordinate. For that reason, we think intermittent use should count toward loading if it properly counted toward assessment of “actual need.” We agree that loading standards make little sense for spread spectrum systems. (We may, however, seek modified coordination rules for spread system uplinks and downlinks, because they should cause and receive less interference to and from terrestrial facilities than conventional earth station signals.) We agree that loading standards for MSS feeder links need a longer lead time than the 30 months proposed in the Petition, and suggest that they be timed to coincide with projected full

³⁹ GE Americom at 11-12.

⁴⁰ SkyBridge at 8.

⁴¹ SIA at 8-9.

⁴² SkyBridge at 8.

loading of the service links. If the system does not achieve the expected service-link traffic after a reasonable time, we see no reason to tie up surplus feeder link spectrum indefinitely. Finally, we agree with SkyBridge that a licensee should not have to disclose loading data. We ask only that the licensee certify to the Commission that its loading criteria have been met.

D. The Proposed Coordination Rules Will Permit the Licensing of More FS Facilities, Without Increasing Harmful Interference to Earth Stations.

The Petition suggests coordination rules that are intended to give earth stations the protection they legitimately need, while still providing coordination for fixed service facilities that do not threaten harmful interference. Current procedures do not respect this balance of interests.⁴³

Consider an earth station that seeks coordination in a shared band having an embedded base of fixed service operations (for example, 11 GHz). The earth station may find that interference from a fixed service facility exceeds its desired objective. But the earth station may choose to waive the interference and accept the site nonetheless. Later, another fixed service applicant may seek to coordinate with the earth station. But the earth station may now deny coordination on the ground of interference from the fixed service station, even if the FS applicant

⁴³ In addition to the case discussed below, current rules permit an earth station to displace a terrestrial station that successfully coordinated with the earth station on an unused frequency. Petition at 6. Because several satellite interests contested this point, SkyBridge at 4; SCD at 4; Comsat at 14-15; SIA at 5 n.8, we now spell it out in more detail. Assume an earth station is coordinated and licensed for the whole band, but is actually using only a small part of the band — a near-universal practice today. An incoming FS station can operate in the unused portion of the band. But it does so at its peril. Unless it has expressly agreed otherwise, the earth station operator retains priority over the entire band, including the portions it is not using. The earth station thus retains the right to shift or expand its frequency usage and interfere with the FS receiver at will, or to require the FS transmitter to cease operations.

presents a much lower level of interference than the earth station itself accepted when it chose the site. The earth station operator may have accepted an interference case from an existing FS terrestrial user because it did not plan to use the interfering frequencies, for example, or because it knew that terrain or a specific local feature, such as a berm or building, would attenuate the interfering signal to an acceptable level. But when the subsequent terrestrial applicant seeks coordination, the earth station operator is free to disregard those same facts and deny the coordination, even where the terrestrial user would not cause it actual interference. To alleviate this asymmetry, the Petition asks that an earth station be required to accept interference from new terrestrial facilities on the same basis as it accepted any interference in the initial coordination.⁴⁴

⁴⁴ Petition at 10-13. Specifically, we proposed to incorporate these new paragraphs in Section 25.203:

(e)(1) An applicant for an earth station authorization may, during the frequency coordination process, choose to accept cases of potential interference into the earth station from terrestrial users. In that event, subsequent terrestrial applicants may coordinate with the earth station at the same level and under the same conditions as the earth station accepted in its coordination, subject to the following paragraphs.

(2) An applicant for an earth station authorization that accepts cases of potential interference from a terrestrial station, as in paragraph (1), may specify that it does so on the basis of frequency offset from the frequencies and bandwidth used by the terrestrial station. In that event, subsequent terrestrial applicants may coordinate in the frequency ranges accepted by the earth station without affording any protection to the earth station.

(3) An applicant for an earth station authorization that accepts cases of potential interference, as in paragraph (1), may specify that it relies on attenuation by a local feature, in which event it must identify the local feature and specify its location and the subtended azimuth. Subsequent terrestrial applicants may coordinate over the arc of azimuths passing through the local feature at the same level as the earth station accepted.

(4) An applicant for an earth station authorization that accepts cases of

Several satellite interests contest this proposal. One objection is procedural — that the FWCC should have brought its request to the National Spectrum Managers Association, rather than the Commission.⁴⁵ But the FWCC believes these issues are important enough to be resolved in public debate, not settled behind closed doors by special interests, no matter how well intentioned. Another objection misreads the Petition as seeking to require an earth station that grants an exception to one FS facility to grant exceptions to other FS applicants.⁴⁶ This is not our intent. An earth station that successfully coordinates at its specified objectives need not grant any exceptions, under our proposal; and if it does grant one, it need not grant others. The proposed rules are triggered only when an earth station itself accepts an interference case, in which event it must extend the same interference objective it accepted (but no more) to later-coordinating FS facilities.

potential interference, as in paragraph (1), may specify that its waiver is based in whole or in part on terrain blockage. In that event the earth station applicant must evaluate the terrain blockage using industry-accepted programs based on current topographical maps. If the evaluated blockage is less than the difference between the desired and accepted interference objectives, and therefore insufficient to clear the interference case, subsequent terrestrial applicants may coordinate at the level that the earth station accepted in its waiver, reduced by the evaluated blockage.

(5) An applicant for an earth station authorization may accept cases of potential interference based on combinations of the factors addressed in paragraphs (2) through (4). In that event, subsequent terrestrial applicants may coordinate at the levels determined under paragraphs (2) and (3), which may depend on frequency and azimuth, as adjusted by terrain blockage as specified in paragraph (4).

Petition at Appendix C.

⁴⁵ Comsat at 16; SIA at 10 n.15.

⁴⁶ HBO at 6; SkyBridge at 5.

Other objections raise technical points. Some parties claim interference is additive, so an earth station might waive one interferor, but find that a second keeps it from meeting its service objective.⁴⁷ Others note the interference environment may change as new radio interference sources are introduced, terrain is altered by construction, and buildings are built and demolished, so that acceptance of one interference case may not justify acceptance of others later in time.⁴⁸ SkyBridge objects to treating attenuation by a local feature, such as a building or berm, as uniform across all azimuths passing through the feature, particularly near its edges.⁴⁹ SkyBridge also asks that acceptance for frequency offset take into account the potential for adjacent band interference,⁵⁰ and that acceptance for attenuation by a local feature or terrain be limited to the frequencies accepted.⁵¹

Although these points may appear valid at first glance, on examination they become insubstantial. We can demonstrate this by considering the worst possible case. Suppose the earth station accepted a 40 dB interference case when it coordinated — that is, the operator chose the site notwithstanding a preexisting fixed service transmitter that illuminates the earth station with a signal 40 dB higher than the agreed-upon objective for FS/FSS coordination. Now a second FS provider seeks to install a transmitter on the same frequency that will place another

⁴⁷ GE Americom at 9-10; SIA at 9-10; SCD at 3-4.

⁴⁸ HBO at 6; Williams at 3.

⁴⁹ SkyBridge at 6.

⁵⁰ SkyBridge at 5.

⁵¹ SkyBridge at 6.

signal 40 dB above the objective (worst case) into the earth station.⁵² Some parties claim that, even if the earth station can function in the presence of the first interfering signal, the additive effect of the second will degrade operation unacceptably.

But this is incorrect. **First:** The total interference from two 40 dB sources is not 80 dB over the objective, as one might expect, but only 43 dB over. In the logarithmic dB (decibel) scale, a doubling of power always increases the level by 3 dB. **Second:** The increase in interference level from 40 to 43 dB is insignificant in practice. If the earth station can accept 40 dB over the objective, it can also accept 43 dB. **Third:** Even the 3 dB increase depends on extremely unrealistic worst case assumptions. The Commission's Rules require earth station antennas to be highly directional.⁵³ The coordination ordinarily evaluates only the worst-case orientation of the earth station antenna. In consequence, two FS transmitters can both be worst-case interferors only if they are (a) both in a straight line with the earth station, (b) both at the same azimuth as the satellite the earth station is pointing at, (c) both aimed at the earth station, and (d) both operating in the same band as the transponder the earth station is using. And again, even in the extremely unlikely event that all these conditions occur together, the total interfering effect of the second FS station is still only an all-but-undetectable 3 dB increase.⁵⁴

The other contingencies listed above that SkyBridge and others raise — changes to the interference environment, edge effects around buildings, adjacent band interference, and so forth

⁵² Our proposed rules would permit the earth station to deny coordination if the applicant's interference were any higher.

⁵³ 47 C.F.R. § 25.209.

⁵⁴ In addition, the agreed-on objective for FSS-FS coordination is calculated on the assumption of multiple FS exposures into the earth station.

— all present interference increases far below the 3 dB worst case. These can have virtually no practical effect.

In short, the proposed coordination procedures will not cause any appreciable increase in interference to earth stations, but will nonetheless permit the successful coordination of many more fixed service facilities than can be accommodated under present practices.

E. Spectrum Availability Will Enhance Competition Among Terrestrial Fixed Service Providers.

Competition is the Commission's primary tool for assuring the American public access to high quality telecommunications services, particularly wireless services, at reasonable prices. Services such as LMDS, MDS, and Fixed Wireless Access, while classed as “wireless,” are also examples of fixed terrestrial microwave services. The hugely popular mobile wireless services, such as PCS, depend on fixed terrestrial links to interconnect their base stations, switches, and other facilities. Competition among both fixed and mobile technologies and providers has yielded new kinds of services at a breathtaking pace, while driving down their costs to dramatic lows. Those successes in turn have driven the expansion of other economic sectors that depend on reliable, inexpensive telecommunications.

Continued competition in wireless telecommunications requires access to adequate spectrum. Unless wireless providers can expand their capacity to meet demand, competition will grind to a halt. Supply and demand will then be governed by spectrum limitations, rather than market forces. Terrestrial fixed providers have gone to great lengths to squeeze the maximum possible use out of the spectrum available (see Part A.3 above), but the laws of physics and economics dictate in the end how much burden can be placed on a finite spectrum allocation.

The Commission is fully aware of the exploding growth of wireless telecommunications services. The demand for spectrum follows in proportion, and must be met if competition is to be maintained. The current practice of routinely licensing shared spectrum to satellite operations on a full bandwidth basis has a stultifying effect on competition in the rapidly growing terrestrial fixed microwave services.

CONCLUSION

The FWCC Petition in this proceeding explained how the Commission's Rules and coordination procedures favor the FSS over the fixed service, despite their "coequal" status. The Petition proposed measures to redress this imbalance: limiting how much spectrum an earth station can license; imposing reasonable loading standards on earth stations; and establishing coordination procedures that can site more FS facilities without increasing interference to earth stations.

To no one's surprise, members of the satellite industry oppose these ideas. Yet the commenters do not dispute receiving preferential treatment over the fixed service. To the contrary, most attempt to defend the preference, particularly as to full-band licensing. Earth stations need ready access to the whole band, they say, in case the space segment provider switches facilities, or a transponder fails, or customers need more or different service.

The FWCC supports earth stations' legitimate spectrum needs. We not only propose that earth stations be licensed for twice the bandwidth they actually need, but endorse a reading of "actual need" broad enough to include virtually all of an earth station's operations in the course of its ordinary business. We conclude the Commission should accommodate, for example, international providers at the mercy of Intelsat assignments; facilities that routinely access

multiple satellites, such as broadcasters and teleports; and even providers serving third-party customers with unpredictable demands. But allowing earth stations to warehouse shared spectrum beyond twice their demonstrated need is fundamentally inequitable. An earth station using one transponder on one satellite should not be able to block an FS applicant over the entire band, on frequencies the earth station never uses. And the fixed service should not have to forgo badly needed spectrum merely to protect the FSS industry against breakdowns of its own equipment. The satellite industry must bear that risk itself, with expedited coordination available in case of emergency.

At the same time, we conclude that projections of “actual need” when an application is filed may not translate to actual use a few years later. For that reason, we ask that earth stations be required to certify they are loaded to half the licensed bandwidth. This is merely a mechanism to monitor compliance with bandwidth limits. Otherwise, we fear, the preparation of at least some earth station applications may become an exercise in creative writing.

The satellite industry also opposes the FWCC's proposals for coordination procedures. Today, an earth station can site itself near one or more FS stations by agreeing to accept their interference. Typically the earth station operator makes this choice because it knows it will use different frequencies, or be safe behind a berm, for example. But when another FS station seeks coordination — on the same frequencies, or behind the same berm — the earth station is free to refuse. The FWCC's procedures would simply require an earth station that accepts interference on choosing a site to accept the same interference (but not more) from later-arriving FS applicants.

Some satellite commenters protest this procedure on the ground that interference is additive. One interfering FS station might be acceptable, they say, but addition of a second would push the interference beyond manageable limits. FS operation on adjacent bands might be intolerable. Attenuation might be uniform across the berm.

But none of these objections stands up to a cursory technical analysis. If the earth station initially accepted one interfering FS station when it coordinated, another FS station that emits out the same power, on the same frequency, from the same direction — an implausible combination — adds only 3 dB to the total. This is insignificant; and the earth station can refuse to accept a higher level of interference. The other effects cited — adjacent-band interference, uneven berms, and so on — each contribute far less than the worst-case 3 dB. In short, the FWCC's proposals will not add appreciable interference to earth stations.

In conclusion, we note that competition has been an exceedingly effective tool for fostering new services at reasonable prices. But all benefits of effective competition for wireless

services, including the fixed service, ultimately depend on adequate spectrum. Allowing satellite earth stations to license and reserve spectrum far in excess of their needs is nothing more than waste of an irreplaceable resource, and the waste of an opportunity to benefit the American public.

Respectfully submitted,

FIXED WIRELESS COMMUNICATIONS
COALITION

A handwritten signature in black ink that reads "Jack Keating". The signature is written in a cursive, slightly slanted style.

By:

Jack Keating, President
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July 27, 1999

Member, Fixed Wireless Communications
Coalition

Appendix A

MEMBERS OF FIXED WIRELESS COMMUNICATIONS COALITION

USERS

Association of Public-Safety Communications Officials
American Mobile Telephone Association
UTC - The Telecommunications Association
National Association of Broadcasters
Independent Cable Telecommunications Association
American Petroleum Institute
International Wireless Cable Association
Personal Communications Industry Association
Norfolk-Southern Railroad
Union Pacific Railroad
Burlington-Northern Railroad
BellSouth
Bell Atlantic
SBC Communications, Inc.
People's Choice TV

MANUFACTURERS

Harris Corporation -- Microwave Division
Digital Microwave Corporation
Sierra Digital Communications
California Microwave, Microwave Data Systems
Tadiran Microwave Networks

CERTIFICATE OF SERVICE

I, Kathryn A. Kleiman, hereby certify that true copies of the foregoing "Reply Comments" were sent this 27th day of July, 1999, via first-class mail, postage prepaid (except as noted) to the following:

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